**10-2 Equations of Circles Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**The center and radius of a circle**

1. Use the sliders in the Gizmotm to set *h* = 2, *k* = 3, and *r* = 4. (To quickly set a slider to a specific number, type the number into the field to the right of the slider, and then press **ENTER.**)
   1. Vary the value of *h*. How does the graph change as the value of *h* changes?

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* 1. Vary the value of *k*. How does the graph change as the value of *k* changes?

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* 1. The red point on the graph represents the center of the circle. How do the coordinates of the center relate to the values of *h* and *k*?

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1. What is the equation of a circle with *r* = 4 and center at (−1, 3)? Use the Gizmo to check your answer by setting *r* = 4 and dragging the center of the circle to (−1, 3).

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1. The radius of a circle is the distance from the center to any point on the circle. Set *h* and *k* to 0. Vary the value of *r*.
   1. How does the graph of the circle change as *r* increases? As *r* decreases?

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* 1. What would happen to the graph of the circle if *r* = 0?

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* 1. What effect does the value of *r* have on the location of the center of the circle?

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* 1. Set *r* = 4. What are the *x*-intercepts and *y*-intercepts of the graph? How far is the center from each of these intercepts?

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* 1. Drag the center of the circle to another location on the graph. What effect does the location of the center have on the radius of the circle?

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1. What is the radius of a circle whose equation is (*x* − 2)2 + (*y* + 4)2 = 64? How do you know?

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1. What is the equation of a circle with the center at (0, −2) and radius of 3? Use the Gizmo to check your answer.

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**The geometric definition of the circle**

The geometric definition of a circle is the set of all points in a plane that are the same distance *r* from the center of the circle.

1. Turn on **Explore geometric definition.** A line segment of length *r* will appear on the graph. One end of the line segment is fixed at the center of the circle. The other end of the segment is marked by a purple point. Drag the purple point and observe its path.
   1. Can the purple point be dragged off the circle? Why or why not?

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* 1. What is the name for this segment?

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1. The equation of a circle is very similar to an algebraic equation you've probably used before.
   1. Take the square root of both sides of the equation (*x* − *h*)2 + (*y* − *k*)2 = *r*2. What formula does the result resemble?

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* 1. A point lies on a circle if the distance between the point and the center of the circle is equal to the radius. Use the formula you just found to determine if the point (5, 2) is on a circle with center (3, 3) and radius 2.5.

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* 1. Use the Gizmo to graph this circle. Click on the **TABLE** tab to see a table of ordered pairs. Why are there two *y*-values, *y*1 and *y*2, in the table for each *x*-value?

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* 1. Use the table to find the possible *y*-values such that (5, *y*) is on the circle. Pick one of these values for *y* and use the distance formula to verify that the point (5, *y*) is on a circle with center at (3, 3) and radius 2.5.

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1. One method for finding the coordinates of points on a circle is to count *r* units away from the center of the circle in the horizontal and vertical directions. For example, if a circle has a center at (−1, 3) and a radius of 5, you can count 5 units in the positive *x* direction to obtain the point (4, 3).
   1. Using this technique, find three other points on the circle.

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1. The points (2, −5) and (2, 1) are on a circle with radius 3.
   1. What is the equation of this circle?

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* 1. Use the table feature to determine if the points are on your circle. Explain your conclusion.

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Now answer the multiple choice questions at the bottom of the GIZMO.